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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/035,660	12/28/2001	Choon-Seng Tan	P01-3978	4624

25235 7590 06/02/2005

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EXAMINER

PATEL, NIKETA I

ART UNIT	PAPER NUMBER
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2182

DATE MAILED: 06/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/035,660

Applicant(s)

TAN ET AL.

Examiner

Niketa I. Patel

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 May 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sicola et al. U.S. Patent No. 6,658,590 B1 (hereinafter "*Sicola*") and further in view of Hanan U.S. Patent No. 6,898,730 B1 (hereinafter "*Hanan*").

3. Referring to claims 1, 9 and 14, *Sicola* teaches a method, device and a system of controlling a failover process in a data storage system including a host, a host bus adapter, a communication fabric including data paths, and standby and active storage controllers [see figure 3, elements 101, 308, 103A, 201, 202], comprising: detecting with an adapter a failover condition [see column 4 – lines 44-65 and column 9 – lines 25-39]; responsive to the detecting, operating the adapter to match the failover condition to a particular failover action in a failover rule set [see column 9 – lines 40-67 and column 10 – lines 1-30, 45-60 and column 13 – lines 20-60]; and performing with the adapter the matched failover action [see column 9 – lines 40-67 and column 10 – lines 1-30, 45-60 and column 13 – lines 20-60.] *Sicola* fails to set forth the limitation of detecting with the host bus adapter a failover condition, however *Hanan* teaches a host bus adapter which uses a 'heartbeat' message to detect a failover condition [see *Hanan* column 4 – lines 28-41] in order to determine failure in the system without a need for special host software.

One of ordinary skill in the art at the time of applicant's invention would have clearly recognized that it is quite advantageous for the system of *Sicola* to be able to detect a failure without the intervention of the host in order to reduce the host-processing load. It is for this reason that one of ordinary skill in the art would have been motivated to implement *Sicola*'s system with mechanism, which allows the system to detect failures with the intervention of a host in order to reduce the host-processing load.

4. **Referring to claim 2**, the teachings of *Sicola* as modified by the teachings of *Hanan*, supra, teaches that the detecting, operating, and the failover action performing are completed without acts initiated by the host [see *Sicola* column 4 – lines 44-52.]

5. **Referring to claim 3**, the teachings of *Sicola* as modified by the teachings of *Hanan*, supra, teaches that the detecting includes identifying a particular failure type and wherein the particular fail over action is selected from an action subset corresponding to the particular failure type [see *Sicola* column 9 – lines 40-67 and column 10 – lines 1-30, 45-60 and column 13 – lines 20-60.]

6. **Referring to claim 4**, the teachings of *Sicola* as modified by the teachings of *Hanan*, supra, teaches that the failure type is selected from the group consisting of inter-controller link down, the active storage controller failed, the standby controller failed, an active path failed, and a standby path failed [see *Sicola* column 9 – lines 40-67 and column 10 – lines 1-30, 45-60 and column 13 – lines 20-60.]

7. **Referring to claim 5**, the teachings of *Sicola* as modified by the teachings of *Hanan*, supra, teaches to detecting with the host bus adapter a failover condition, *Sicola* & *Hanan* are silent about prior to the performing, determining with the host bus adapter if all active paths have

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failed and if all active paths determined failed, skipping the failover action performing when the host bus adapter determines either all other available paths have failed or a standby path is marked as unusable. However, this feature is deemed to be inherent since *Sicola & Hanan* teaches to determine a failover condition and in response to the failover condition rerouting data through an alternate rout [see *Sicola* column 9 – lines 40-67 and column 10 – lines 1-30, 45-60 and column 13 – lines 20-60]. If all the routs have failed then there would be no alternate route for the system, therefore it would have to skip the performance of the failover action.

8. **Referring to claim 6**, the teachings of *Sicola* as modified by the teachings of *Hanan*, supra, teaches further including after the failover action performing, operating the host bus adapter to initiate failback when a controller in a preferred slot is replaced, when the controller in the preferred slot is rebooted, and when unusable paths become usable [see *Sicola* column 4 – lines 62-67 and column 5 – lines 1-7.]

Referring to claim 7, the teachings of *Sicola* as modified by the teachings of *Hanan*, supra, teaches performing load distribution with the host bus adapter between the host and the controllers [see *Sicola* column 4 – lines 62-67 and column 5 – lines 1-7 and column 8 – lines 7-19.]

9. **Referring to claims 8 and 19**, the teachings of *Sicola* as modified by the teachings of *Hanan*, supra, is silent about enforcing with the host bus adapter anti-thrashing rules comprising preventing the performing from being completed more than set number of times per pre-set monitoring interval.

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention that an anti-thrashing was an old and well-known type of safeguard to prevent the

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system from falling into an endless loop. It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to implement anti-thrashing safeguard to prevent the system from falling into an endless loop.

10. **Referring to claim 10**, the teachings of *Sicola* as modified by the teachings of *Hanan*, supra, teaches that the failover actions are selected by the failover mechanism from a failover rule set [see *Sicola* column 9 – lines 40-67 and column 10 – lines 1-30, 45-60 and column 13 – lines 20-60.]

11. **Referring to claim 11**, the teachings of *Sicola* as modified by the teachings of *Hanan*, supra, teaches that the failover mechanism is further configured to determine at the time of the detecting, operating conditions within the data storage system, to determine whether the operating conditions match a set of failover conditions, and if matching, to select the failover action corresponding to the operating conditions [see *Sicola* column 9 – lines 40-67 and column 10 – lines 1-30, 45-60 and column 13 – lines 20-60.]

12. **Referring to claim 12**, the teachings of *Sicola* as modified by the teachings of *Hanan*, supra, teaches that the failover conditions are specific to the detected redundancy failure [see *Sicola* column 9 – lines 40-67 and column 10 – lines 1-30, 45-60 and column 13 – lines 20-60.]

13. **Referring to claim 13**, the teachings of *Sicola* as modified by the teachings of *Hanan*, supra, teaches that the failover mechanism presents a single logical unit number (LUN) entity to operating system device drivers in the host processor that is discoverable a plurality of times and wherein the failover actions are initiated without prior communication with the host processor [see *Sicola* column 4 – lines 4-65 and column 6 – lines 51-65.]

14. **Referring to claim 15**, the teachings of *Sicola* as modified by the teachings of *Hanan*, supra, teaches that the host bus adapter detects a potential failure in redundancy and determines whether to initiate the failover action by determining whether failover operating circumstances and failover operating conditions for the potential failure are satisfied [see *Sicola* column 9 – lines 40-67 and column 10 – lines 1-30, 45-60 and column 13 – lines 20-60.]

15. **Referring to claim 16**, the teachings of *Sicola* as modified by the teachings of *Hanan*, supra, teaches that the failover operating circumstances require when an active path in the communication fabric fails that at least one path to the controllers is available and that a path to the standby controller is usable [see *Sicola* column 9 – lines 40-67 and column 10 – lines 1-30, 45-60 and column 13 – lines 20-60.]

16. **Referring to claim 17**, the teachings of *Sicola* as modified by the teachings of *Hanan*, supra, teaches that the initiated failover action is selected from the set of failover actions based on existing ones of the failover operating conditions [see *Sicola* column 9 – lines 40-67 and column 10 – lines 1-30, 45-60 and column 13 – lines 20-60.]

17. **Referring to claim 18**, the teachings of *Sicola* as modified by the teachings of *Hanan*, supra, teaches that the data storage devices are grouped into subsets and wherein the host bus adapter is configured to perform the failover action for the subsets when a particular storage device within the subset requires the failover action [see *Sicola* column 9 – lines 40-67 and column 10 – lines 1-30, 45-60 and column 13 – lines 20-60.]

18. **Referring to claim 20**, the teachings of *Sicola* as modified by the teachings of *Hanan*, supra, teaches that the host bus adapter presents a single logical unit number (LUN) entity to

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each of the operating system device drivers that is discoverable multiple times [see *Sicola* column 5 – lines 59-65 and column 6 – lines 51-65.]

Response to Arguments

19. Applicant's arguments with respect to claims 1-20 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

20. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following documents have been made record of to further show the state of the art as it pertains to failover and fail-back firmware:

Mori U.S. Patent No.: 6,606,683 B2

Pittelkow et al. U.S. Patent No.: 6,883,065 B1

Cheng et al. U.S. Patent No.: 6,823,477 B1


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Niketa I. Patel whose telephone number is (571) 272 4156. The examiner can normally be reached on M-F 8:00 A.M. to 5:00 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jeffrey A. Gaffin can be reached on (571) 272 4146. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

NP
05/26/2005



KIM HUYNH
PRIMARY EXAMINER
5/27/05